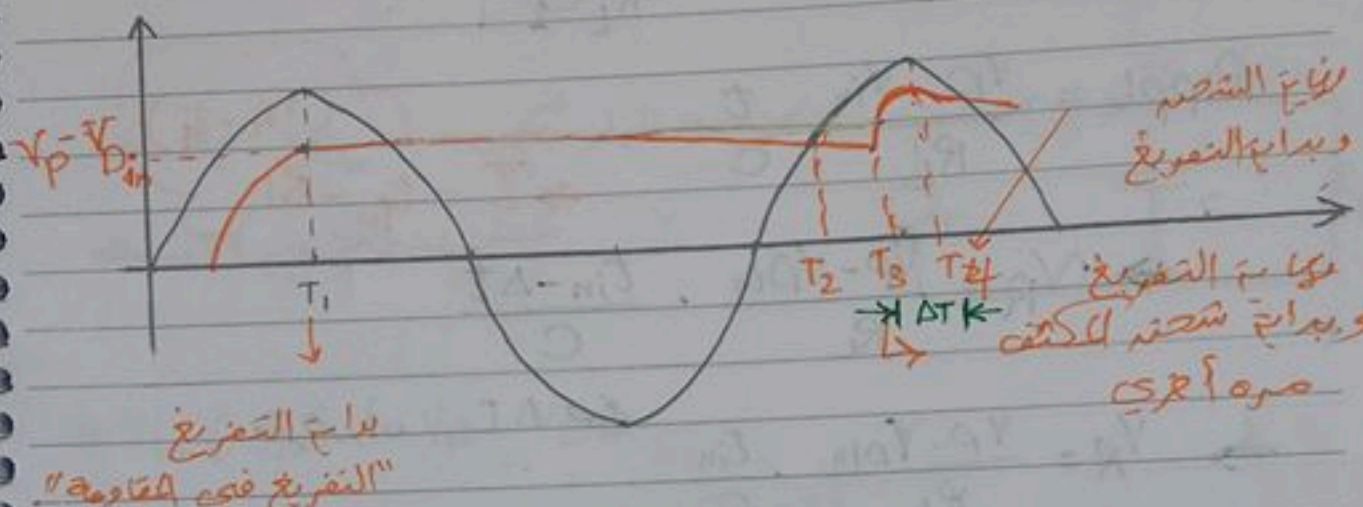
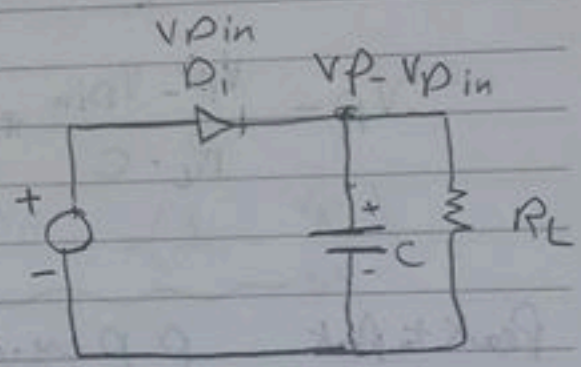




* time Constant ثابت الزمن

$\tau = R_L C$

* $T_1 - T_4 = T_{in}$ الزمن الدوري

↓

تمثل موجة كاملة

→ $T_4 - T_3 = \Delta T$ الفترة الزمنية الشحن

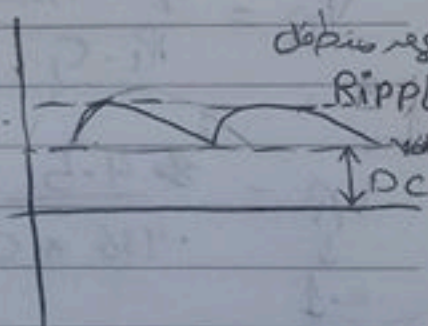
→ $V_{out} = V_p - V_{D_{on}}$

$V_{out} = (V_p - V_{D_{on}}) e^{-t/RC}$

→ $T_1 \ll RC$

$V_{out} = (V_p - V_{D_{on}})(1 - \frac{t}{R_L})$

$V_{out} = (V_p - V_{D_{on}})(1 - \frac{T_1}{R_L C_1})$



* نهاية التفريغ عند T_3

*

$$V_{out} = (V_P - V_{D_{on}}) - \frac{V_P - V_{D_{in}}}{R_L C_1} \cdot T$$

$$Ripple = \frac{V_P - V_{in}}{R_L} \frac{t}{C}$$

$T = t_{in} - \Delta t$ ($t_{in} - t_4$)

$$\rightarrow V_R = \frac{V_P - V_{D_{in}}}{R_L} \cdot \frac{t_{in} - \Delta t}{C}$$

بفرضنا انه Δt صغير

$$\rightarrow V_R = \frac{V_P - V_{D_{in}}}{R_L} \cdot \frac{t_{in}}{C}$$

$t_{in} = \frac{1}{f_{in}}$

$$V_R = \frac{V_P - V_{D_{in}}}{R_L \cdot C} * \frac{1}{f_{in}}$$

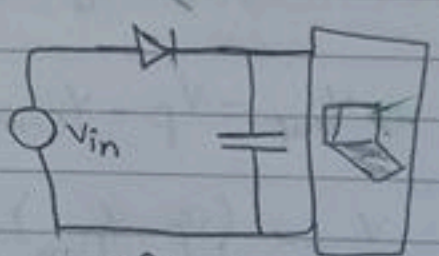
Peak to Peak $P.P = g.v$ ⇐ 60Hz / 110 تحول عمل

التردد — الجهد

$$V_R = \frac{V_P - V_{D_{in}}}{R_L \cdot C_1 \cdot f_{in}}$$

$$V_R = \frac{4.5 - 0.8}{.436 * C_1 * 60}$$

$V_R \downarrow 0.1$



$\Delta R \simeq .1\ V$

$V_{D_{in}} = 0.8$

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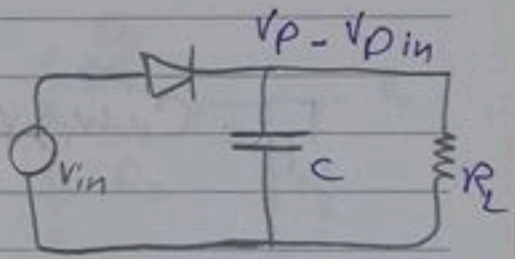
Peak Diode Current :-

$\Rightarrow V_p - V_{D_0}$ ← اقصر قيمة للتيار

$\Rightarrow$ at $V_p >> V_{D\,in}$



$\Rightarrow V_{in}(t_1) = V_p - V_{D\,in}$

$V_p = V_{in} \sin(\omega t_1)$ ← نسمي سرور أكبر تيار

$\Rightarrow v_{in}(t_1) = V_p \sin \omega t_1$

$\rightarrow \sin \omega_{in} t_1 = \dfrac{V_p - V_R}{V_p} = \left(1 - \dfrac{V_R}{V_p}\right)$

$\Rightarrow V_{out} = V_{in}(t)$

$\rightarrow V_{in}(t_1) \simeq V_{out} = V_p \sin(\omega_{in} t)$

$\Rightarrow I_p = I_C + I_{R_C} = \dfrac{V_p}{R_L}$

$I_{D_1}(t) = \left(C \dfrac{dv}{dt}\right) + \dfrac{V_p}{R_L}$

$\therefore I_p = C_1 \omega_{in} V_p \cos \omega_{in} t + \dfrac{V_p}{R_L}$

$\therefore \cos\theta = (1 - \sin^2\theta)^{1/2}$

$\cos \omega_{in} t_1 = \sqrt{1 - \left(1 - \dfrac{V_R}{V_p}\right)^2}$

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$$\therefore I_p = C_1 \omega_{in} V_p \sqrt{1 - \left(1 - \frac{V_R}{V_p}\right)^2} + \frac{V_R}{R_L}$$

$$I_p = C_1 \omega_{in} V_p \sqrt{\frac{2V_R}{V_p} - \frac{V_R^2}{R_L^2}} + \frac{V_R}{R_L}$$

very small ≈ 0

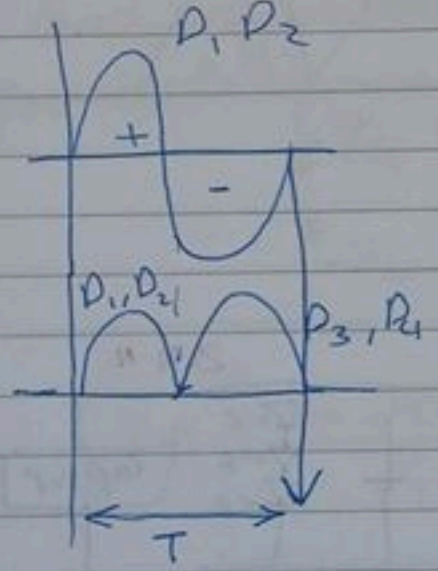
$$I_p = C_1 \omega_{in} V_p \sqrt{\frac{2V_R}{V_p}} + \frac{V_R}{R_L}$$

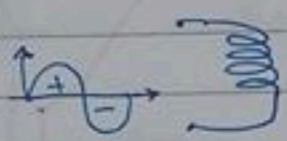
$$I_p \simeq \frac{V_p}{R_L}\left(R_L C \omega_{in}\sqrt{\frac{2V_R}{V_p}} + 1\right)$$

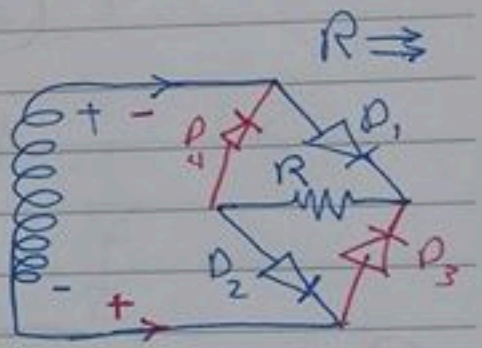
I_p قيمة التيار

* Full wave Rectifier

(Bridge Rectifiers)







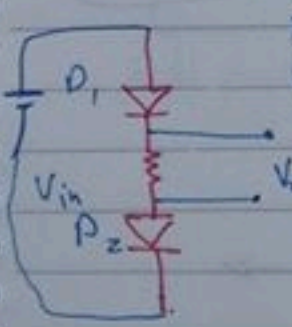
at $\frac{1}{2}$ wave $\rightarrow V_R = \frac{V_p - 2V_{Din}}{R_L C f_{in}}$

عايزين V_R صغيرة

at full wave $\rightarrow V_R = \frac{1}{2}\frac{V_p - 2V_{Din}}{R_L C f_{in}}$

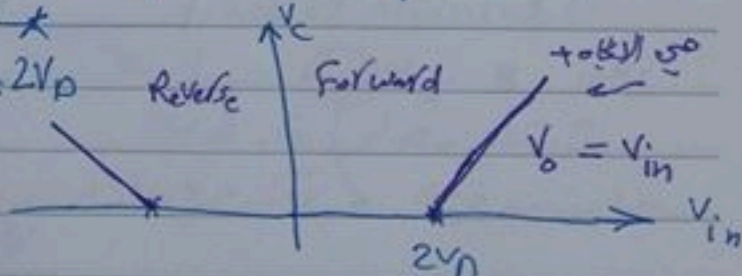
$\rightarrow$ at half wave اقصى جهد $2V_p$

at full wave اقصى جهد V_p لان الدايود هيتقسم عليه



$V_{in} = V_o + V_{D_1} + V_{D_2} = V_o + 2V_D$

$V_o = V_{in} - 2V_D$



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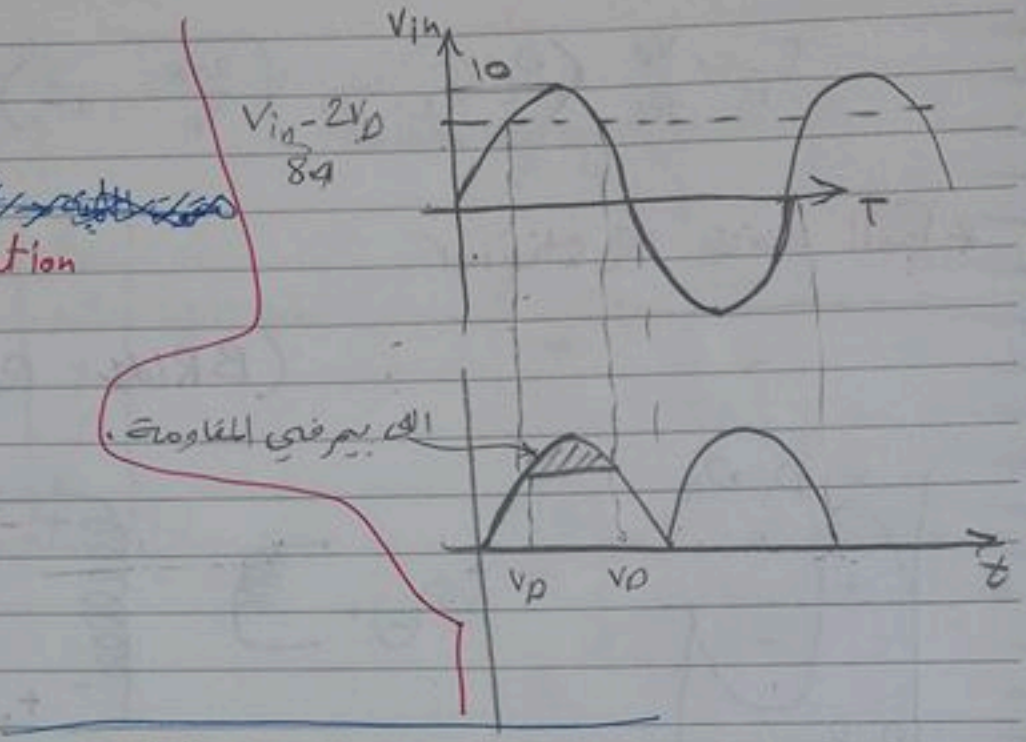
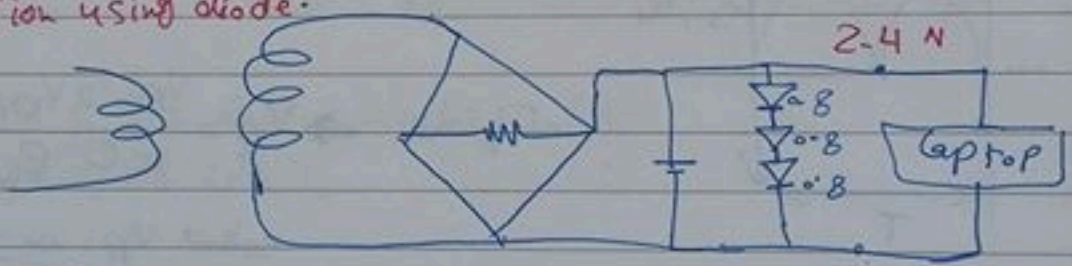
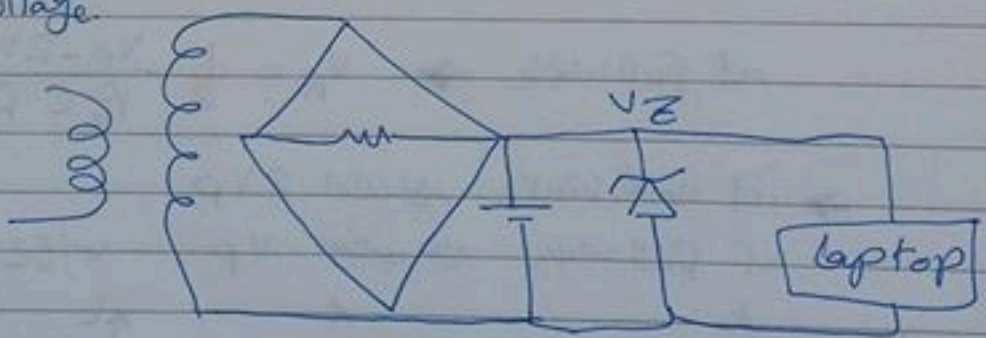


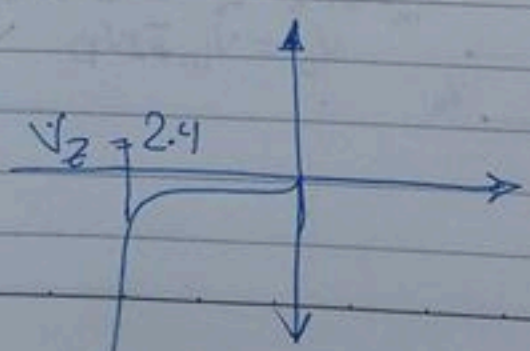
Voltage Regulation

Regulation using diode.

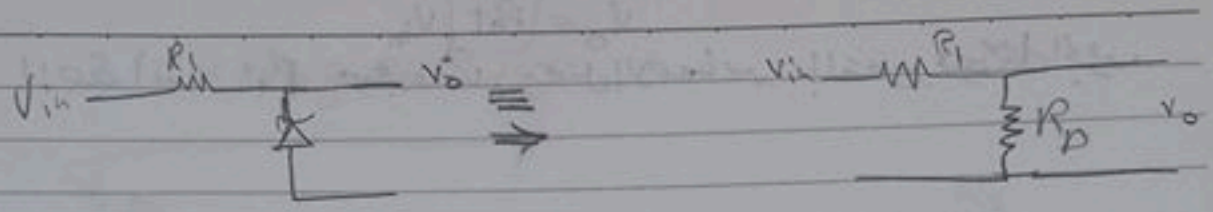


⇒ Line Voltage.





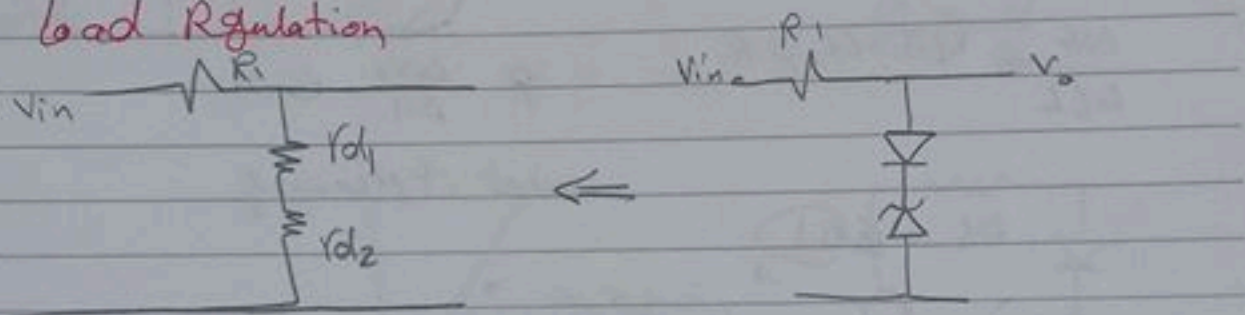
Hi. Star



$\frac{V_{in}}{2}$ ثابت وقيمة $V_o = V_{in} \frac{R_D}{R_1 + R_D}$ is line Rgulation

$\times .5$

load Rgulation



$$I_{D_1} = \frac{V_{in} - V_{Don} - V_Z}{R_1 - 1K}$$

(5 ← .8 ← 2.1)

* لو عندى التيار وعايز أعرف إن مقاومة الـ Diode هتغير قيمتها.

$$r_{d_1} = \frac{V_{th}}{I_d} = \frac{26\,m.V}{I_{D_1}}$$

∴ ناخد $V_{DF} = V_{th}$ ، 26

Line Rgulation

$$\rightarrow \frac{V_o}{V_{in}} = \frac{r_{d_1} + r_{d_2}}{R_1 + r_{d_1} + r_{d_2}} \rightarrow \text{if } \frac{V_o}{V_{in}} = .06$$

what it Meaning ?!

يعنى $V_o = .06 V_{in}$ مثلاً لو الدخل التغير بمقدار ١ فولت ∴ الخرج هيتغير بمقدار 0.6 فولت

عايزين قيمة ده تكون صغيرة علشان تقلل التغير فى الفولت.

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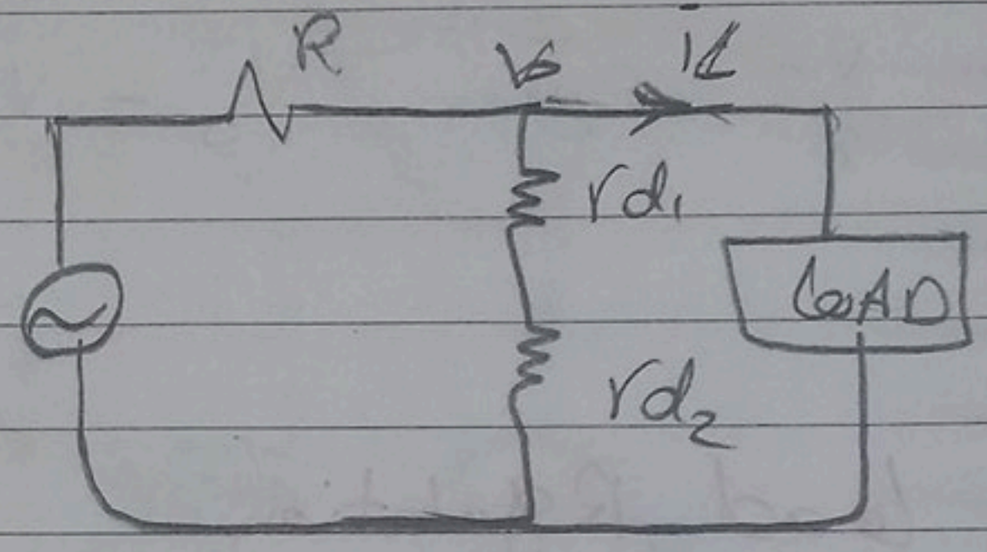
$V_o = \boxed{Pat}\ V_{in}$

لاحظ أنه Pat صغر علشان يقلل الاحساس بالتغير في حمل الجهد.

$$i_L = \frac{-V_{out}}{(r_{d1}+r_{d2}) // R_1}$$



$$\frac{\Delta V_o}{\Delta i_L} = (r_{d1}+r_{d2}) // R_1 = \text{if } \frac{\Delta V_o}{\Delta i_L} = 6\ \Omega$$

what it Meaning

$\Delta V_o = 6\,\Delta i_L$

Δi_L هو اللي بيتغير

if $\Delta i_L = 1\ M.A$ $\rightarrow \Delta V_o = 6 * 1\ M.A = 6\ M.V$

Δi_L يتضرب عايز يبقى صغرة علشان

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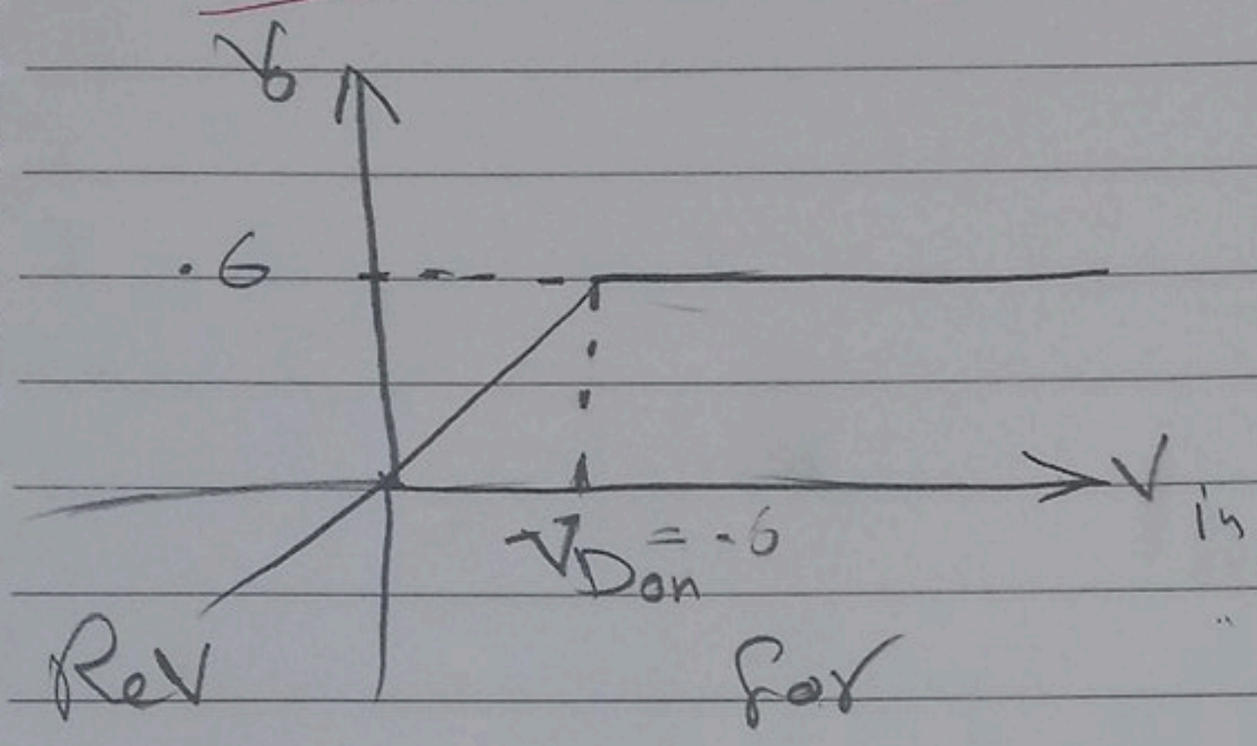
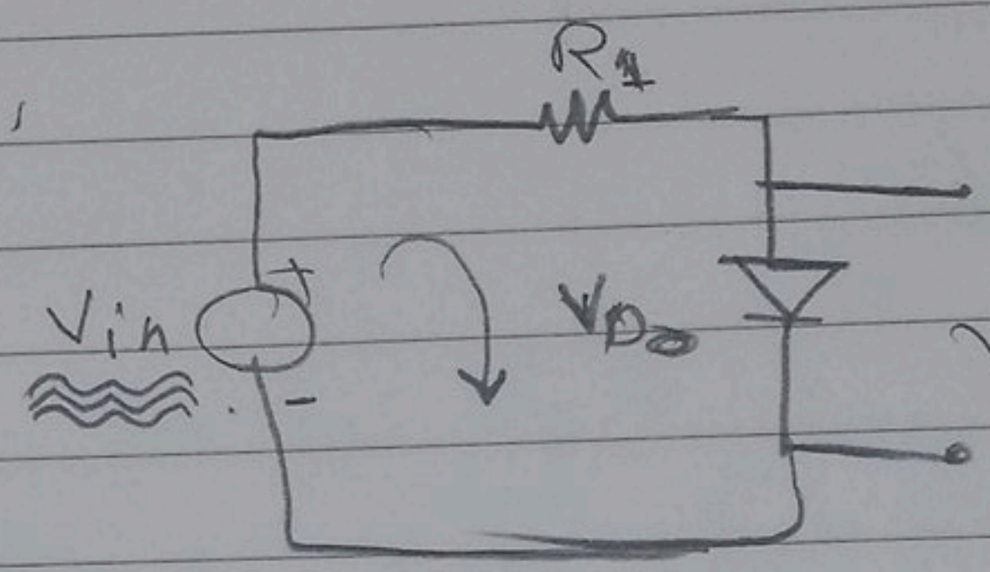
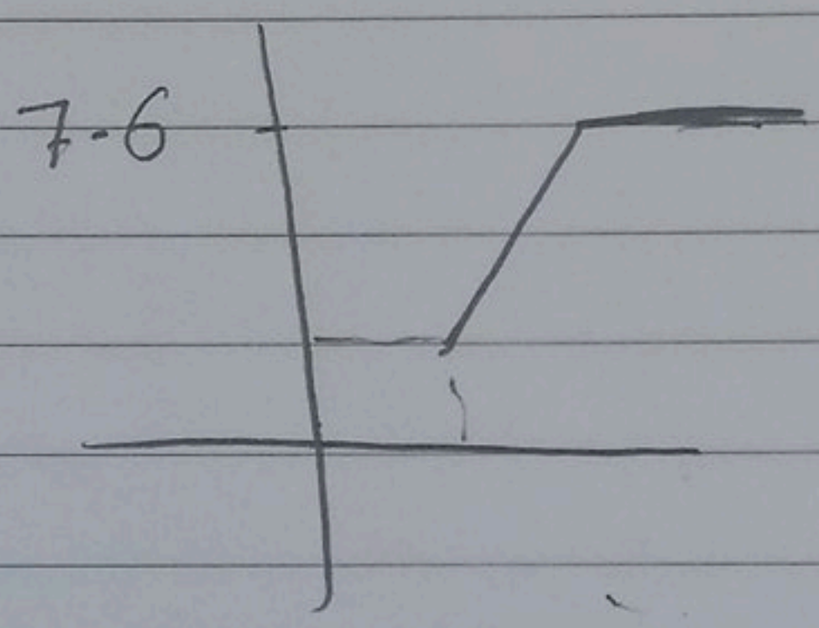
Limiting circuits

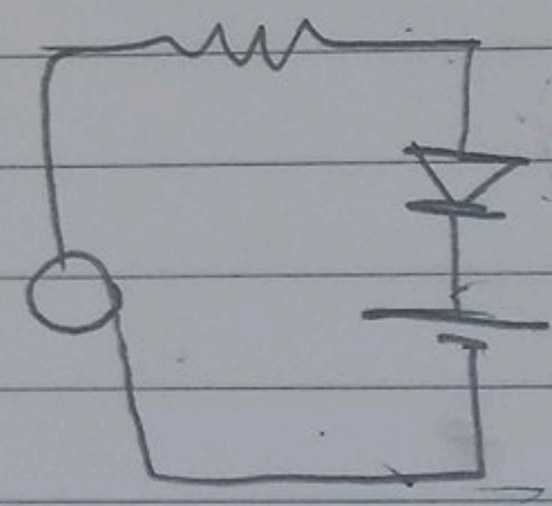


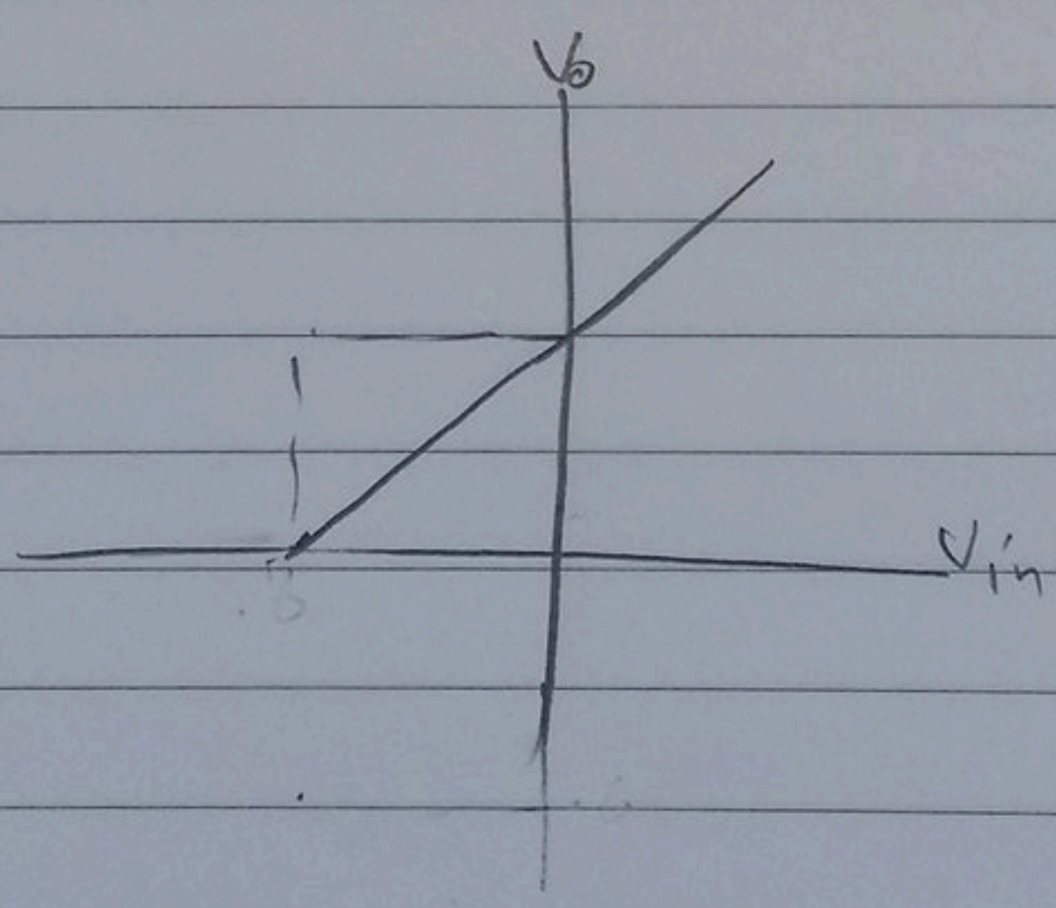
Rev for

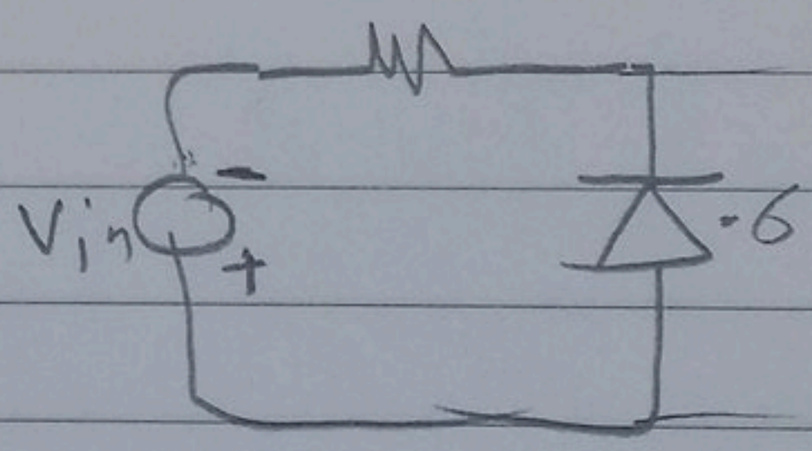


Forward









Reverse

Hi. S